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ANONYMOUS TRADING SYSTEM WITH
IMPROVED QUOTE INPUT CAPABILITIES

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This is a continuation of U.S. patent application
serial No. 09/029,181, filed June 15, 1998 in the name of
Edward R. Howorka and entitled "ANONYMOUS TRADING SYSTEM
WITH IMPROVED QUOTE INPUT CAPABILITIES."

TECHNICAL FIELD

10 The present invention is directed generally to
computerized trading systems and more particularly to a
method and apparatus for anonymous trading wherein an
individual offer is made available only to a subset of
the available counterparties.

15 BACKGROUND ART

In many computerized trading systems, the
participants (individual traders or institutions) are
qualified in advance by an exchange and each offer is
broadcast from one participant to all other qualified
20 participants.

When the subject of the trade is a commodity (such
as wheat or copper) or a financial instrument (such as
Treasury Bills or foreign currency), multiple offers for
the same commodity or instrument are conventionally

ranked by price per unit. Depending on the trading conventions in effect, offers at the same price may be further ranked by size and/or time in a queue of available offers; however, for any given commodity or financial instrument, only one offer is at the head of an associate queue.

Under many market conditions, "market makers" (institutions and/or individual traders whose open offers are available to other traders) will set a price at or slightly above the best price currently available, with the expectation that their offer will reach the head of the relevant queue in due course. However, if there is a sudden change in market conditions, the market maker may wish to cancel or modify his outstanding offer before it reaches the head of the queue. To that end, it is known to warn the trader responsible for an open quote when his quoted price is equal to the best price currently available and/or when his offer reaches the head of queue. Similarly, if the maker's quote was ready to be accepted (i.e., it is the highest ranked quote in the system) but is subsequently bettered by another maker, the original maker may be given an opportunity to revise his offer or remove it from the market.

In the traditional voice broker foreign exchange market, the broker announces "Your bid" to a market maker when the maker's own quote is at the head of the queue; the broker also (optionally) announces and/or cancels that quote when someone else submits a better price.

In an anonymous electronic brokerage system such as the EBS system or Reuters 2000-2 in which individual trades of foreign currency are settled directly between two banks (or "trading floors") rather than through an exchange or a clearing house, the identity of the parties is kept confidential until an offer from one party has been matched to a bid from another party and the matching criteria include not only price, but also the existence of bilateral credit between the two parties. Thus, unlike a traditional voice broker who processes only one quote at a time (typically the first offer in the queue) and who provides both parties with an opportunity to accept or reject a potential trade after the parties have already been identified, a computerized matching process is able to perform many tasks concurrently and to use objective matching criteria (such as preestablished counterparty credit limits) without divulging any confidential credit information. Moreover, at least the known EBS system operates in a credit screened market in which a price is not offered to a potential counterparty unless it is "Dealable" - i.e., each party to the potential transaction has previously indicated a willingness to deal with the other party. Thus, there is no longer a single queue for a given currency, but a separate logical queue (typically containing only a subset of the open quotes for each trading floor). Accordingly, the known EBS system displayed an active quote on the maker's terminal in a red background (a so-called "Red Quote") if that quote was either the best

Dealable (or the best regular size Dealable) quote on at least one trading floor, i.e., the quote was at the head of some floor's queue of "Dealable" quotes, thereby providing the maker with a signal that his quote has the potential of being about to be accepted. In addition to the visible warning (the quote is displayed on a red background), the EBS voice says "Your bid/offer" and the background of the key fields on the transaction panel turns from yellow to red. Preliminary versions of the EBS system also provided an indication if a quote was "joined" with a Red Quote, i.e., was in the Dealable queues of at least one trading floor and was equal to the best price that was Dealable to that floor, but was not at the head of the Dealable queue on any trading floor, and thus did not qualify as a Red Quote.

However, as a result of the lack of credit between many possible pairs of trading partners and the fact that market makers are reluctant to make an offer that is substantially worse than the best price that is currently available, almost every quote is at the head of the queue on at least one trading floor, and thus the indication that a quote was Dealable on at least one trading floor had limited practical value.

A quote that lost its red status (as indicated by the transaction panel fields turning from red to yellow) is said to be "bettered." If the "Cancel When Better option" in the trader profile is set, such a bettered Red Quote was automatically canceled by the EBS system.

More recent versions of the EBS system have also included a capability for aggregating a regular size (typically US \$10 Million) Dealable quote from several quotes for smaller quantities to display a synthetic "regular" size Dealable price whose individual components had priority in time and/or price over any other available quotes. In that case, the "regular Dealable price" would be equal to the worst priced component of the aggregated deal.

10 BRIEF DISCLOSURE OF INVENTION

For each quote entered into the system by a market maker, the system determines if it is waiting to be "hit" (about to be accepted) at a substantial number of trading floors, and if so, notifies the trader originating the quote.

15 In accordance with one aspect of the invention, the substantial number of floors is preferably expressed as greater than a predetermined percentage of the available trading partners with whom credit has been established on a bilateral basis, and is preferably greater than 25%.

20 In accordance with another aspect of the invention, a quote is considered about to be accepted at a particular trading floor if it would be included as a component in an order at the Regular Dealable price currently available to that trading floor.

25 In accordance with yet another aspect of the invention, the system provides the market maker with a quantitative indication as to how many trading floors (or

percentage of available trading partners) are about to accept his quote, and/or how good his quote must be to be Hittable by a given number of trading floors (or percentage of available trading partners).

5 The invention includes a process for notifying a maker in a computerized trading system that his offer is subject to being accepted by another trader using the trading system, the process comprising:

10 determining when a predetermined percentage of traders are permitted to accept the makers quote, the predetermined percentage being more than one and less than all of the traders with which the maker has bilateral credit; and

15 informing the maker that his offer can be accepted by the predetermined percentage of traders.

20 In one embodiment, the maker is visually informed that his offer can be accepted by the predetermined percentage of traders. The maker may also be audibly informed that his offer can be accepted by the predetermined percentage of traders.

25 In the preferred embodiment, the trader is only permitted to accept the maker's quote if there is sufficient bilateral credit between the maker and the trader. In the preferred embodiment, the trader is only permitted to accept the maker's quote if there is sufficient bilateral credit between the maker and the trader and the maker's quote is the best available to the trader. In a further preferred embodiment, the maker's quote can be accepted only if it meets the foregoing

criteria and is earlier in time to any other quote available to the trader at the same price.

5 In one embodiment, the maker is informed that his offer can be accepted by the predetermined percentage of traders by providing a maker with a quantitative indication of the percentage of traders who can accept his offer. The quantitative indication is preferably in the form of a graph.

BRIEF DESCRIPTION OF THE DRAWINGS

10 Other objects and features of the present invention will be apparent from the following description of a presently preferred embodiment taken in connection with the accompanying drawings, in which:

15 **Fig. 1** is a functional overview of a computerized trading system in accordance with the present invention showing the sources of the data used to calculate the quote status message and how the status message is transmitted from the Arbitrator to the workstation.

20 **Fig. 2** shows the Transaction Panel of the known EBS system, which may be used without modification with the present invention.

Fig. 3 is a functional block diagram of the software which determines the current Red Quote status for a particular quote.

25 **Fig. 4** shows an alternate embodiment for the Transaction Panel in which the ratio of Hittable floors to available partners is displayed as a horizontal bar graph below the quote, and a numerical indication of what

price would be required to be Hittable at a given percent of available trading partners is shown above the quote.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENT

5 **Fig. 1** is a functional overview of the EBS system modified in accordance with the present invention. An early version of the EBS system is described in more detail in US 5,375,055, which is hereby incorporated by reference.

10 The Arbitrator node **ARB** computes and maintains the status of all open quotes and sends **QtePosition** messages to the maker's Mark Access Node (bank node) **MAN** signaling any changes in the status of a quote. If a trader uses the Cancel When Bettered option, the **QtePosition** message also can be used by the bank node **MAN** to determine when
15 his quote needs to be canceled.

 Upon receiving the **QtePosition** message, the maker's bank node **MAN** sends the **QtePositionWS** message to the Workstation **WS**. The Workstation then processes the **QtePositionWS** message, updating the quote status display
20 (**Fig. 2**) or canceling the quote, as appropriate.

 The processing of the **QtePosition** and **QtePositionWS** messages may be conventional and unchanged from prior versions of the EBS system. In particular, when the status of an active quote on the Maker's Transaction
25 Panel (**Fig. 2**) changes from normal (logical 0) to red (logical 1), the background color **Y/R** of the box **PW** containing the least significant digits of the quoted price ("80" in the illustrated example) as well as the

smaller box containing the Big Figure amount (1.40) changes from yellow to red. When the status changes from red to normal, either the quote is withdrawn (if Cancel When Bettered is active) or the background changes from red to yellow.

A quote is "Hittable" from a trading floor, if a regular size hit from that floor would be automatically matched with some part of the quote. In the described embodiment, a quote is "red" if it is Hittable from more than the specified percentage of the trading floors which have bilateral credit with the submitter of the quote. The percentage is a global system parameter, with a default value of 25%.

Suppose that the regular amount is 10M and that the following bids are available (Dealable) to a trading floor X (ranked by decreasing price and then by increasing time of submission): Note that in foreign currency trading, the price is conventionally expressed in "pips" [least significant digits of base currency for a predetermined quantity of local currency], that the amount is conventionally expressed in millions of US dollars, and that a quote can be either a single-sided bid to buy the local currency, or a single-sided offer to sell the local currency, or a two-sided bid and offer [separated by a spread].

Quote	Price	Amount	Maker
Bid 1	65	5M	Floor A
Bid 2	60	3M	Floor B
Bid 3	20	4M	Floor C
Bid 4	20	5M	Floor D

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The first three bids are Hittable from floor **X**, while **Bid 4** is not.

10 **Bid 3**, for example, is Hittable from floor **X** because a regular size hit (Sell 10 M at 20) from that floor would match a part (2M) of that bid. If **Bid 3** is Hittable from enough floors (25% of the trading floors which have bilateral credit with Floor **C**), then **Bid 3** is red at the Maker's transaction panel.

15 Reference should now be made to **Fig. 3**, which is a functional block diagram of the "Red Quote" software in the Arbitrator **ARB** which determines the current Red Quote status for a particular quote.

20 As part of the startup process, the Arbitrator reads (block 100) the parameter **PctFloorsRedQte** from the Arbitrator section of the **GLOBAL.DAT** file. This is the partner floor percentage determining whether a quote is red.

25 In known fashion, the Arbitrator maintains (block 102), for each trading floor that is currently logged into the network, a queue in the form of a linked list of pointers to atomic data objects (individual quotes), with each queue being ordered by price and time and the

objects in the queue being those quotes that are currently available to that trading floor. The queues are updated each time a new quote is received or its status is changed (it has been accepted or withdrawn, or it has been tentatively matched pending credit verification and acknowledgment by both parties) (**Quote/Hit** branch from decision block **104**) and each time the bilateral credit status between any two trading floors changes (**Credit** branch from decision block **104**).

In addition, in accordance with the present invention, for each quote Q , the Arbitrator uses the data in the trading floor queues to maintain (block **106**) a respective count of floors H_Q from which the quote can be hit by a regular size buy/sell request (typically ten million US dollars).

The Arbitrator also maintains in known fashion (block **108**) a credit availability matrix containing the bilateral credit status between each pair of trading floors that are currently connected to the system, which is then used to update the quote queues for any affected trading floors (block **102**). In accordance with the present invention, for each floor F , the Arbitrator also uses the data in the credit availability matrix to maintain (block **110**) the count of its partners P_F (i.e., other floors that have bilateral credit with the given floor).

The Arbitrator thus is able to dynamically adjust both counts (H_Q and P_F) in response to any trading or credit messages, and determine (block **112**) for each quote

whether the quote's H_q -count is higher than a predetermined percentage (defined initially as 25%) of the P_F -count for the floor that submitted the quote. The result of this test is stored with the other data
5 concerning that particular quote (block **114**), and if the Red Quote status has changed, the QtePosition message is transmitted to the trading floor's bank node **MAN** (block **116**).

10 The above operations may be clarified with a few numerical examples.

When **PctFloorsRedQte** = 25 (current default value) and $P_F = 195$, then a quote is red if it is Hittable from more than $(195 * 25) / 100 = 4875 / 100 = 48$ floors. This illustrates that the above definition of red status
15 requires a strict inequality.

When **PctFloorsRedQte** = 25, and $P_F = 4$, then a quote is red if it is Hittable from more than $(4 * 25) / 100 = 100 / 100 = 1$ floors.

When **PctFloorsRedQte** = 0, a quote is red if it is
20 Hittable from one or more floors. Thus, with this setting of the global parameter, the above definition of Red Quote is very similar to that used in the known EBS system.

When **PctFloorsRedQte** = 100, no quote is ever red.
25 All active quotes should appear "yellow."

From the foregoing description and examples, it should be apparent that the Red Quote status, as defined above, depends on both the ranking of the quote relative to other quotes in the market and on the bilateral credit

relationship of the submitting floor with other floors,
and that the Arbitrator **ARB** dynamically re-computes the
Red Quote status of quotes any time that any of these
factors is affected (due, for example, to better prices
being submitted or new credit being granted by another
floor).

Fig. 4 shows an alternate embodiment of the
invention in which rather than comparing the variable H_Q
with a predetermined percentage of the variable P_F , the
Arbitrator computes the ratio H_Q/P_F , and includes that
ratio in the quote status message **QtePosition** each time
the ratio changes by a predetermined increment (for
example, 5%). In that case, rather than indicating the
status of the active quote as merely normal or red, the
workstation can display it as a number or in graphical
form. In the illustrated example, the ratio is displayed
as a horizontal bar graph **BG** below the quote, which in
the illustrated example extends about 2/3 of the full
width of the pips window **PW** indicating that the price is
Hittable by about 65% of the maker's available (on line
and with established credit) trading partners.

As also shown in **Fig. 4**, the market maker may also
(or alternatively) be provided with a numerical
indication **SP** of what price would be required to be
Hittable at a predetermined percent of available trading
partners (for example, the same percentage
PctFloorsRedQte as was used in **Fig. 3**). This could be
readily computed by generating an ordered list of the
worst Hittable prices (i.e., the price required to

complete the lowest ranking component of a regular sized deal) from the quotes of each available trading partner. Since the available partners are already identified in the credit matrix, and since each queue already contains
5 a pointer to the last component of the aggregated regular Dealable price, such a display would not require substantial additional computation, and would provide the market maker with additional assurances that his quote was competitive with other quotes in the market and was
10 priced neither too high nor too low.

It should be apparent that the ratio H_Q/P_F and the numerical price indication **SP** will change at a greater frequency than the Red Quote status **R/Y**. Accordingly, in a system having Market Distributor nodes **MD** as shown in
15 Fig. 1 which use a price queue similar to that maintained in the Arbitrator **ARB** for computing Dealable prices and transmitting them to the individual trading floors **MAN**, performing the required computations in a more distributed fashion (in the Market Distributors) will
20 make better use of the communication network.

Doubtless, other variations on the concepts underlying the present invention will be apparent to those skilled in the art.